

### CLAIMS

1. A method for monitoring the state of vehicle chassis, especially of rail vehicles, characterised in that
  - physical variables (3) are measured on the chassis by means of sensors (21, 22),
  - the measured and eventually processed variables (6) are compared with modelled variables (7) by means of a processing unit (24), wherein the modelled variables are determined from specific variables,
  - a classification into classes of causes is performed from the comparison (8) by means of a processing unit (24) and
  - an evaluation is carried out as a result of the classification.
2. The method according to claim 1, characterised in that speeds, accelerations and/or forces are measured as physical variables (3).
3. The method according to any one of claims 1 or 2, characterised in that the processing unit (24) comprises
  - a model (1, 25) of the vehicle which continuously identifies the parameters of the vehicle and by which means a simulatroy prognosis of the vehicle behaviour is continuously compiled.

and/or

- at least one damage evolution or ageing model (9) of vehicle components which is used to determine and/or update the remaining lifetime (10) before a critical state is reached or before a necessary maintenance measure.
4. The method according to any one of the preceding claims, characterised in that the comparison (8) of the measured variables (6) and the modelled variables (7), eventually after some processing, is made by means of a correlation (2).
  5. The method according to any one of the preceding claims, characterised in that the classification is performed by means of an electronic processing unit (24), in particular by means of a computer.
  6. The method according to any one of the preceding claims, characterised in that a classification is made as to whether a cause inside the vehicle or an external cause is involved.
  7. The method according to any one of the preceding claims, characterised in that a classification is made as to the location of the cause involved inside the vehicle.
  8. The method according to any one of the preceding claims, characterised in that the modelled variables are calculated.
  9. A device for monitoring the state of vehicle chassis, in particular for applying the method according to any one of the preceding claims, comprising

- one or more sensors (21, 22) for measuring physical variables on the chassis,
- a processing unit (24) for calculating modelled variables,
- a processing unit (24) for comparing the measured and eventually processed variables with modelled variables,
- a processing unit (24) for classifying as a result of the comparison and
- means for evaluating.

10. The device according to claim 9, characterised in that the processing unit (24) comprises

- a model of the chassis (1, 25) which continuously identifies its parameters and by which means a simulatory prognosis (5) of the chassis behaviour is continuously compiled

and/or

- at least one damage evolution or ageing model (11, 26) of chassis components which is used to determine and/or update the remaining lifetime (12) before a critical state is reached or before a necessary maintenance measure.

11. The device according to claim 9 or 10, characterised in that an interface to a superordinate control system (27) of the vehicle is connected to the processing unit (24), via which data on the actual driving state (4), in particular the speed of travel, are delivered to the processing unit or

messages therefrom may be saved (28) and may be transmitted to the driver or traction unit conductor (29) or an external control centre (30).

12. The device according to any one of claims 9 to 11, characterised in that at least one sensor (21, 22) is a vibration sensor, an acceleration sensor, an impact sensor, an acoustic sensor, a sound sensor, an eddy current sensor, a magnetic field sensor, a temperature sensor, a force sensor, an strain sensor, a distance sensor, a radar Doppler sensor or an ultrasound sensor.
13. The device according to any one of claims 9 to 12, characterised in that at least one sensor (21, 22) is arranged
  - on a wheelset, in particular on a wheel, on a wheelset axle or on a wheelset bearing,
  - on a bogie or chassis frame,
  - on a primary spring suspension, in particular on a spring, on a shock absorber or on a wheelset guide,
  - on a secondary spring suspension, in particular on a spring, a shock absorber, preferably on a stabiliser or a stop buffer,
  - on a traction linkage,
  - on a drive, in particular on a drive motor, a gear, a clutch or a drive suspension,

or

- on a brake, in particular a brake disk, on a brake cylinder, on a brake lining, on a brake pad, on a brake linkage or a brake caliper.
14. The device according to any one of claims 9 to 13, characterised in that the means for evaluation comprise a signalling device (29) inside the vehicle and/or a signalling device in a mobile or stationary control centre outside the vehicle including a data transmission device (30) from the vehicle to the control centre.